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Psychological and Livelihood Impact of the COVID-19 Pandemic on Mining Workers

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Abstract
The COVID-19 pandemic has had far-reaching impacts across various sectors, with the mining industry, particularly informal mining labour, facing disproportionate consequences. This study examines the impact of the pandemic on the livelihoods, working conditions, and health status of mining workers during the pre- and lockdown periods. The study was conducted among 100 mining workers from Khandbandh, Jilling, and Dubuna mines in the Joda Block of Keonjhar district, Odisha, using a purposive sampling technique. Primary data were collected between December 2022 and January 2023 through structured interviews. The data were analysed using descriptive statistics and a paired t-test to compare pre- and during-pandemic conditions. The paired t-test results indicate that the decline in income and consumption expenditure during the pandemic was statistically significant ($p < 0.001$). The findings reveal a significant decline in workers' average monthly income and consumption expenditure during the pandemic period. Psychological distress was found to be widespread, with all respondents (100%) reporting some form of mental stress. Among the workers affected by COVID-19, 61% were male, and 39% were female, indicating that male workers were more affected than female workers. Common psychological issues included stress, depression, emotional disturbance, and exhaustion, particularly among workers who experienced quarantine. The study concludes that the COVID-19 pandemic had a severe impact on both the economic and psychological well-being of mining workers. It highlights reduced work efficiency, increased stress levels, and growing vulnerability among workers. The findings emphasize the need for targeted policy interventions focused on social protection, occupational safety, and improved health infrastructure to support mining workers during a crisis.

Keywords: COVID-19, Mining Workers, Informal Labour, Occupational Health, Livelihood, COVID-19 lockdown, Pre-lockdown, Post-lockdown

Background

The COVID-19 pandemic disrupted economies and societies globally, triggering unprecedented challenges for workers in the informal sector. In India, lockdowns and containment measures caused massive job losses and income shocks, particularly for those employed in hazardous and informal occupations like mining. Odisha, with its mineral-rich districts such as Keonjhar, is a significant contributor to India's mining output, and a large segment of its workforce is engaged in informal mining operations. Iron ore is abundantly available in the districts of Mayurbhanj, Sundargarh, Keonjhar, and Jajpur. Keonjhar also has abundant Iron, manganese ore, and chromite deposits. Keonjhar supplies around 80% of Odisha's manganese production. The manganese mines are located at Banspani, Barbil and Barjamda, while Chromite mines are situated in Baula, Nuasahi, and Phulinjhorhul. Keonjhar District is

highly rich in mineral resources and contains large deposits of iron, manganese, and chromium ores. There are two major categories of modern mining: opencast mines and underground mines. Mining is a vital activity in the region, providing employment on the one hand and generating revenue for the government on the other. The mining industry provides raw materials, minerals, and metals critical to our economy. A mining worker represents the unorganised sector of the economy. Those who work in the unorganised sector are called informal workers. Globally, the lockdowns to contain the COVID-19 pandemic have had a disproportionate impact on poor and vulnerable groups. COVID-19 was a disease that could affect people's lungs and airways. It is caused by a virus called Coronavirus. Common symptoms of infection include respiratory symptoms, fever, cough, wheezing, and difficulty breathing. Due to the rapid spread of the coronavirus and lockdown conditions in every country to restrict its transmission, the work of mining workers has been affected.

A substantial body of literature has examined the socio-economic vulnerabilities of informal workers during crises. Marimuthu et al. (2021) identify contract worker displacement and operational shutdowns as primary challenges in India's mining sector. Jain (2020) and Patra & Patra (2014) focus on occupational health hazards, particularly respiratory diseases and musculoskeletal problems exacerbated during COVID-19. Muhamad et al. (2021) highlight the role of vertical trust and organisational justice in mitigating psychosocial risks. Studies such as Banarji (2017) and Yakovleva (2007) underscore the gendered aspects of informal mining labour, while Devat (2010) and Srinivas & Sindhe (2016) draw attention to systemic regulatory weaknesses in the sector. Despite this growing scholarship, post-pandemic regional studies remain limited, particularly in Odisha. This study aims to fill that gap. The COVID-19 pandemic has brought unprecedented challenges to the global labour market, particularly affecting informal sector workers engaged in hazardous occupations like mining. The following section presents a review of empirical and theoretical contributions from national and international studies, with emphasis on the socioeconomic, health, and institutional dimensions relevant to mining labour.

The mining sector in India is highly informal, employing many unskilled workers with limited social protection. Marimuthu et al. (2021) identified that the pandemic caused severe disruption in mining activities, particularly affecting contract and daily-wage workers who faced income losses, job insecurity, and livelihood risks. Their study further emphasises the need for green recovery strategies and health preparedness within the sector. Charles et al. (2022) investigated the trade-off between economic output and workplace safety in U.S. metal mining and found that demand shocks due to price fluctuations led to higher injury rates, suggesting that in boom periods, safety investment is deprioritised—insights equally relevant for Indian contexts.

The dual challenge of COVID-19 and existing occupational risks intensified health vulnerabilities among mining workers. Studies such as those by Jain (2020) and Basavaraja & Veerendra (2020) in Karnataka revealed high prevalence of respiratory ailments, musculoskeletal disorders, and poor access to healthcare among mine labourers. These findings underscore the neglect of occupational health services in India's unorganised mining sector. Patra and Patra (2014), in a study of iron ore mining in Odisha, observed that mining workers face chronic health issues such as acute respiratory infections due to long-term exposure to dust and pollution, aggravated further by a lack of protective gear and awareness. Emerging literature has drawn attention to the mental health of workers in high-risk sectors during the pandemic. Muhamad et al. (2021), studying copper and gold miners, concluded that "vertical trust" — trust in supervisors and institutions — significantly influenced psychological resilience during COVID-19. Similar risks apply in

Indian mining belts, where communication gaps and weak institutional trust exacerbate worker stress and uncertainty.

Informality in Indian mining is not only an economic challenge but also deeply gendered. Banarji (2017) and Yakovleva (2007) emphasise that women in mining often work under precarious conditions, with little bargaining power and high exposure to exploitation. Their work underscores the need for gender-inclusive labour policies and formalisation pathways. Sahoo (2018) and Patra et al. (2015) examined the impact of mining on rural livelihoods in Odisha. While mining activities contribute to income generation, they also result in socio-economic disruptions and environmental degradation. These studies provide crucial insights into the trade-offs between employment and sustainable community development. Devat (2010) and Srinivas & Sindhe (2016) pointed out structural deficits in India's labour governance framework, especially within the mining sector. These include inadequate labour rights enforcement, ineffective contract regulation, and absence of health safety nets—issues that became more acute during the pandemic.

While mining operations were deemed essential and remained operational, the workforce was reduced, resulting in overwork and increased exposure to physical strain and stress.

The COVID-19 pandemic significantly affected the working conditions of mining workers due to several interlinked factors. Lockdowns and restrictions halted or slowed down mining operations. Only a limited number of personnel were allowed on-site, leading to increased workloads for those present.

Supply chain disruptions delayed equipment, safety gear, and essential materials. Mining is already hazardous, and the risk of virus transmission in cramped conditions (like underground mines or shared transport) made it worse. Lack of proper personal protective equipment (PPE) in the early stages. Inadequate health facilities at or near mining sites for handling COVID-19 cases. Many workers faced layoffs or reduced hours due to halted production. Contract and informal workers were especially vulnerable to loss of income and job insecurity. Delayed or non-payment of wages became common. Uncertainty about jobs, fear of infection, and isolation led to increased stress, anxiety, and depression among workers. Limited access to mental health services worsened the situation. Many mining workers live in dormitories or camps with shared facilities. Social distancing was nearly impossible, leading to high transmission risks. Migrant workers, who make up a significant portion of the mining workforce, returned to their villages. Labour shortages led to overburdening remaining workers and worsening conditions. The pandemic magnified existing vulnerabilities in the mining sector—especially inadequate health infrastructure, informal employment, and poor living conditions—leading to worsened working conditions, both physically and mentally.

In the COVID-19 pandemic era, psychological problems have become a mental health issue as part of health and safety, particularly among iron and manganese miners. The World Health Organisation (WHO) defines the workplace as a place with physical, mental, social and organisational conditions that protect and enhance the overall health of its members. According to Act No. 1 of 1970 on safety at work, a workplace is any closed, open, temporary or permanent area where workers frequently enter to carry out business. Furthermore, it has been shown that workplace-related hazards consist of chemical, physical (mechanical, electrical, loose energy), biological, ergonomic and psychological factors. Psychological problems are common in the mining industry and affect workers' welfare and workplace safety (International Council of Mines and Metals,2020).

Therefore, companies need to try to support physical and psychological safety, which is driven by higher costs. The purpose of this study is to analyse the health status of workers during the epidemic process. Assessing workers' health and psychological well-being helps implement effective interventions, promoting safety, reducing stress, and improving productivity.

Materials and Methods

Secondary data were collected from various sources, including books, journals, newsletters, bulletins, and working papers. Primary data were collected through personal interviews conducted between December 2022 and March 2023. The study primarily used a purposive sampling technique, and some statistical tools, such as the paired sample t-test, were applied with the help of Excel and SPSS software for data analysis. A structured questionnaire was prepared to collect primary data from 100 workers out of a total of 244 mining workers, and a field research method was adopted.

Keonjhar district comprises 13 blocks, of which the Joda block was purposively selected due to its maximum number of mine units. Joda block has eight mines, and 100 samples were selected from three mine units: Khandbandh, Jilling, and Dubuna. A pilot survey was conducted, and the data were analyzed using SPSS software. Various statistical and econometric methods were employed for the analysis of the data.

Results and Analysis

Table 1. Monthly Income of Mining Workers: Pre vs During COVID-19 (Paired t-test)

Time Period	**Mean (₹)**	**Standard Deviation**	**N**
Pre-COVID-19	10,770.00	1,482.93	100
During COVID-19	5,367.00	699.83	100
Test	**t-value**	**df**	**p-value**
Paired t-test	39.802	99	< .001

Table 2. Monthly Family Consumption Expenditure of Mining Workers: Pre vs During COVID-19 (Paired t-test)

Time Period	**Mean (₹)**	**Standard Deviation**	**N**
Pre-COVID-19	9,304.50	1,340.81	100
During COVID-19	5,904.70	1,491.55	100
Test	**t-value**	**df**	**p-value**

Time Period	Mean (₹)	Standard Deviation	N
Paired t-test	25.127	99	< .001

Source: Primary data

Note: Values are presented as mean and standard deviation. A paired sample t-test was used to compare the pre-COVID-19 and during the COVID-19 periods. The results are statistically significant at $p < .001$.

A paired sample t-test was conducted to examine the differences in monthly income and family consumption expenditure of mining workers between the pre-COVID-19 and during the COVID-19 periods. The results indicate that the mean monthly income of workers during the pre-COVID-19 period ($M = 10,770.00$, $SD = 1,482.93$) was significantly higher than during the COVID-19 period ($M = 5,367.00$, $SD = 699.83$). Similarly, the mean monthly family consumption expenditure declined from the pre-COVID-19 period ($M = 9,304.50$, $SD = 1,340.81$) to the COVID-19 period ($M = 5,904.70$, $SD = 1,491.55$). The paired t-test results confirm that these differences are statistically significant for both income ($t = 39.802$, $df = 99$, $p < .001$) and consumption expenditure ($t = 25.127$, $df = 99$, $p < .001$). This decline in income and expenditure reflects the economic vulnerability of mining workers during the pandemic, as many workers faced job loss, reduced working days, and financial instability. The reduction in consumption expenditure further indicates adjustments in household spending due to income shocks.

Health Status

Table 3. Health Status of Mining Workers During the COVID-19 Pandemic (N = 100)

Gender	Affected by COVID-19, n (%)	Not Affected, n (%)	Total, n (%)
Male	25 (25.0)	36 (36.0)	61 (61.0)
Female	17 (17.0)	22 (22.0)	39 (39.0)
Total	**42 (42.0)**	**58 (58.0)**	**100 (100.0)**

Source: Primary data

Note: Values are presented as frequency and percentage.

The analysis of the health status of mining workers during the COVID-19 pandemic indicates that 42% of the respondents were affected by the disease, with males (25%) being more affected than females (17%). This suggests that male workers, possibly due to higher occupational exposure, were more vulnerable to infection. In contrast, 58% of the workers remained unaffected, reflecting a combination of preventive practices, individual resilience, and possibly reduced exposure. Among those affected, treatment preferences varied widely. Many relied on government medical facilities, while others opted for private clinics. Additionally, traditional systems such as homoeopathy and Ayurveda, along with home-based

remedies, were commonly used, highlighting the diverse healthcare-seeking behaviour shaped by accessibility, personal beliefs, and economic considerations. Affected workers reported experiencing a range of symptoms, including fever, chills, headache, muscle ache, cough, difficulty in breathing, dizziness, sore throat, and loss of taste or smell. Hospitalisation periods ranged from 1 to 15 days, and recovery durations varied between 1 and 20 days, indicating differences in disease severity, treatment received, and individual health conditions.

Preventive measures were also widely adopted by the workers, with many practising social distancing, using masks, and applying sanitisers during and after the pandemic. These behaviours likely contributed to the protection of those who remained unaffected. Overall, the findings emphasise the occupational vulnerability of mining workers to infectious diseases, the role of both formal and traditional healthcare systems, and the importance of personal preventive practices in mitigating the spread of COVID-19 within this population.

Table 4. Duration of Hospitalization and Treatment Status of Mining Workers During COVID-19 (N = 100)

Gender	Hospitalized (1–15 days), n (%)	Home Quarantine (1–15 days), n (%)	Not Admitted, n (%)	Total, n (%)
Male	11 (11.0)	14 (14.0)	36 (36.0)	61 (61.0)
Female	9 (9.0)	8 (8.0)	22 (22.0)	39 (39.0)
Total	**20 (20.0)**	**22 (22.0)**	**58 (58.0)**	**100 (100.0)**

Source: Primary data

Note: Values are presented as frequency and percentage.

The findings in Table 4 indicate that a majority of mining workers (58%) were not admitted to any healthcare facility during the COVID-19 pandemic, suggesting either mild symptoms **or** limited access to institutional healthcare services, particularly in remote mining areas. Among those who required care, 20% of workers were hospitalized for 1–15 days, while 22% underwent home quarantine for a similar duration, reflecting a combination of formal medical intervention and self-managed treatment practices. A gender-wise breakdown shows that male workers accounted for a slightly higher proportion of both hospitalization (11%) and home quarantine (14%) compared to female workers (9% and 8%, respectively). This difference may be attributed to greater occupational exposure of males, as they often perform more physically intensive or higher-risk tasks in mining operations, potentially increasing susceptibility to severe COVID-19 symptoms.

The preference for home quarantine among a notable portion of workers could also indicate economic and logistical constraints, as hospitalization might lead to loss of daily wages or challenges in accessing healthcare facilities. Additionally, the use of home-based care aligns with cultural and traditional practices where mild illness is often managed within the household, sometimes supplemented by over-the-counter medication or alternative remedies.

Overall, the results highlight that while a significant proportion of workers avoided hospitalization, a substantial number still required medical attention or home-based isolation, demonstrating the varied severity of COVID-19 impacts among mining workers. These findings underscore the need for targeted workplace health interventions, ensuring both access to timely medical care and support for home-based management, particularly for workers in high-risk roles.

Table 5. Psychological Impact of COVID-19 on Mining Workers by Gender

Gender	Psychologically Affected, n (%)	Not Affected, n (%)	Total, n (%)
Male	61 (61.0)	0 (0.0)	61 (61.0)
Female	39 (39.0)	0 (0.0)	39 (39.0)
Total	**100 (100.0)**	**0 (0.0)**	**100 (100.0)**

Source: Primary data

Note: Values are presented as frequency and percentage.

The findings reveal a striking outcome that all mining workers (100%) experienced psychological effects during the COVID-19 pandemic, indicating the pervasive nature of mental health challenges in this period. Among them, male workers accounted for a larger share (61%) compared to female workers (39%). Although both genders were affected, the higher proportion among males may reflect greater exposure to occupational and economic stressors during the pandemic. Overall, the results underscore that the psychological impact of COVID-19 was widespread and deeply felt across the mining workforce, irrespective of gender.

Table 6. Symptoms of Psychological Effects During the COVID-19 Pandemic

Symptoms	Frequency (n)	Percentage (%)
Stress	7	7.0
Psychological Distress	44	44.0
Anxiety	12	12.0
Depression	30	30.0

Symptoms	Frequency (n)	Percentage (%)
Sleep Disturbance	7	7.0
Total	**100**	**100.0**

Source: Primary data

Note: Values are presented as frequency and percentage.

The study indicates that psychological distress was the most reported effect, with 44% of respondents experiencing it. This suggests that general mental strain and coping with the pandemic were highly prevalent. Depression affects 30% of individuals. This is significant, as it shows nearly one-third of respondents faced deeper, long-lasting negative emotions during the pandemic. Anxiety was reported by 12% of respondents. This indicates that, while present, it was less common compared to distress and depression. Stress and sleep disturbances were each reported by 7%. While relatively lower, these symptoms still highlight important aspects of mental health disruptions. Every single respondent (100%) reported experiencing at least one psychological symptom during the pandemic. The results indicate that the pandemic universally impacted mental health, with distress and depression as the leading effects. The pandemic had a profound psychological impact on all respondents, with psychological distress and depression being the most prevalent issues. This suggests the need for strong mental health support systems during and after crisis events, focusing on managing distress and depression as the leading effects.

Table 7. Treatment Preferences of Mining Workers During the COVID-19 Pandemic (N = 100)

Preference for Treatment	Affected by COVID-19, n (%)	Not Affected, n (%)	Total, n (%)
Government Medical	16 (16.0)	0 (0.0)	16 (16.0)
Private Medical	4 (4.0)	0 (0.0)	4 (4.0)
Household Treatment	22 (22.0)	0 (0.0)	22 (22.0)
No Treatment	0 (0.0)	58 (58.0)	58 (58.0)
Total	**42 (42.0)**	**58 (58.0)**	**100 (100.0)**

Source: Primary data

Note: Values are presented as frequency and percentage.

Among the workers affected by COVID-19, different treatment preferences were observed. A majority relied on household treatment (22%), followed by government medical facilities (16%) and private medical care (4%). Notably, 58% of respondents did not require any treatment, as they were not affected by the virus. This pattern suggests limited access to formal healthcare facilities and a reliance on self-care or home-based remedies among mining workers.

Table 8. Problems Faced by Mining Workers During the COVID-19 Pandemic (N = 100)

Problems Faced	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)	Total n (%)
Income Reduction	39 (39.0)	61 (61.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (100.0)
Difficulty in Saving	58 (58.0)	11 (11.0)	31 (31.0)	0 (0.0)	0 (0.0)	100 (100.0)
Difficulty in Investment	58 (58.0)	11 (11.0)	31 (31.0)	0 (0.0)	0 (0.0)	100 (100.0)
Poor Working Conditions	0 (0.0)	98 (98.0)	2 (2.0)	0 (0.0)	0 (0.0)	100 (100.0)
Travel Restrictions	24 (24.0)	74 (74.0)	2 (2.0)	0 (0.0)	0 (0.0)	100 (100.0)
Lack of Leave	11 (11.0)	86 (86.0)	2 (2.0)	0 (0.0)	0 (0.0)	100 (100.0)
Transportation Problems	3 (3.0)	1 (1.0)	96 (96.0)	0 (0.0)	0 (0.0)	100 (100.0)
Social Distancing Norms	100 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (100.0)
Limited Working Hours	100 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (100.0)
Use of Mask, Sanitizers, Hand Gloves	100 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	100 (100.0)

Source: Primary data

Note: SA = Strongly Agree; A = Agree; DA = Disagree; SD = Strongly Disagree. Values are presented as frequency and percentage.

As shown in Table 8, mining workers faced a variety of challenges during the COVID-19 pandemic, reflecting both financial and workplace-related difficulties. All workers reported a reduction in income, with 39% strongly agreeing and 61% agreeing that their earnings decreased, highlighting the substantial economic impact of the pandemic on this workforce. Similarly, difficulties in saving and investment were widely experienced, as 58% of workers strongly agreed and 11% agreed, while 31% remained neutral, indicating that nearly one-third of workers were uncertain or less affected in these areas.

Poor working conditions were reported by the majority of respondents, with 98% agreeing and 2% remaining neutral, emphasizing the demanding and sometimes unsafe nature of mining operations during the pandemic. Travel restrictions also posed significant challenges, with 24% of workers strongly agreeing and 74% agreeing that these limitations disrupted their work and mobility, while 2% remained neutral. Limited leave was another important issue, with 11% strongly agreeing and 86% agreeing that they had restricted access to leave during this period.

Transportation, however, was not perceived as a major barrier, as 96% of workers remained neutral and only a small fraction (3% strongly agreed and 1% agreed) reported difficulties, suggesting that commuting did not significantly exacerbate work-related stress. In contrast, adherence to preventive health measures was universal. All workers (100%) strongly agreed on the importance of social distancing norms, limited working hours, and the use of masks, sanitizers, and gloves, demonstrating a high level of awareness and compliance with recommended safety protocols.

Overall, these findings indicate that financial difficulties, including reduced income and challenges in saving and investment, were the most pressing issues faced by mining workers. Poor working conditions and travel restrictions further contributed to occupational stress, while transportation posed minimal concern. Importantly, the universal adoption of health and safety measures highlights the proactive response of workers to mitigate COVID-19 risks. This detailed understanding of workers' experiences underscores the need for targeted workplace interventions that address both economic and occupational challenges while reinforcing health and safety practices during pandemic situations.

Discussions

The findings of the study highlight the precarious nature of informal mining labour in the face of combined health and economic shocks during the COVID-19 pandemic. Although mining activities continued during this period, the burden of the crisis fell disproportionately on workers, reflecting weak institutional support in terms of income security, occupational safety, and access to healthcare. This observation is consistent with previous studies that have pointed to systemic neglect in labour protection and occupational health in the informal mining sector.

The study further demonstrates a significant decline in income and consumption expenditure during the pandemic compared to the pre-pandemic period, confirming the stated hypotheses. This decline indicates increased financial vulnerability among workers, with only a small proportion managing to save during the crisis. The reduction in income and savings reflects the broader economic disruptions caused by lockdown measures and reduced employment opportunities.

In terms of health impact, the findings reveal that a considerable proportion of workers were affected by COVID-19, with male workers showing relatively higher exposure compared to female workers. This may be attributed to the nature of mining work, which involves higher physical exposure and occupational risk.

A key finding of the study is the widespread psychological impact of the pandemic. All respondents reported experiencing some form of psychological distress, indicating the severity of mental health challenges among mining workers. This aligns with existing research that emphasizes the growing mental health burden among vulnerable occupational groups during crisis situations. The high prevalence of stress, anxiety, and emotional exhaustion highlights the urgent need to integrate mental health support within occupational health frameworks.

Overall, the study underscores the multidimensional impact of the COVID-19 pandemic on mining workers, affecting their economic stability, physical health, and psychological well-being. These findings call for comprehensive policy interventions focusing on social protection, improved healthcare access, and strengthened occupational safety measures to enhance the resilience of informal mining workers in future crises.

Conclusion and Policy Recommendations

The study concludes that the COVID-19 pandemic had a significant impact on the economic, health, and psychological well-being of mining workers. A substantial decline in income and consumption expenditure was observed during the pandemic period compared to the pre-pandemic period. A considerable proportion of workers were affected by COVID-19, with male workers being relatively more vulnerable than female workers. The study also reveals widespread psychological distress among workers, indicating high levels of stress, anxiety, and emotional instability. These findings highlight the vulnerability of informal mining labour and the lack of adequate institutional support during crisis situations. The findings further indicate that existing social security mechanisms were insufficient to protect workers from sudden economic shocks. Moreover, the absence of structured health and welfare support systems exacerbated the challenges faced by mining workers during the pandemic.

This study underscores the urgent need for comprehensive labour reforms in the mining sector, particularly targeting informal workers. Recommendations include: Expanding social protection coverage for mining workers. Mandating occupational health services at mining sites. Establishing emergency response protocols for future crises. Promoting formalisation of informal mining labour. Investing in gender-sensitive mining policies and welfare schemes. Strengthening access to affordable healthcare and mental health support services for mining workers is also essential. Additionally, there is a need for targeted skill development and alternative livelihood opportunities to reduce workers' dependency on vulnerable mining employment. Ensuring proper implementation of labour laws and regular monitoring of working conditions at mining sites is equally important. By addressing these gaps, policymakers can ensure both economic resilience and human security in resource-rich districts like Keonjhar District.

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